

$$R''/B'' = \text{GainRB}' * (R'/B') + \text{OffsetRB}' \quad \dots (9)$$

In the same manner, a calculation as to the ratio  $(R+B)/(G1+G2)$  is performed as follows:

$$\begin{aligned} \text{GainRBG1G2}' &= \{ (RaD+BaD)/(G1aD+G2aD) \\ &\quad - (RbD+BbD)/(G1bD+G2bD) \} / \\ &\quad \{ (RrefaD+BrefaD)/(G1refaD+G2refaD) \\ &\quad - (RrefbD+BrefbD)/(G1refbD+G2refbD) \} \end{aligned} \quad \dots (10)$$

$$\begin{aligned} \text{OffsetRBG1G2}' &= \{ (RaS+BaS)/(G1aS+G2aS) \} \\ &\quad - \text{GainRB}' * \{ (RrefaS+BrefaS) / \\ &\quad (G1refaS+G2refaS) \} \end{aligned} \quad \dots (11)$$

$$\begin{aligned} (R''+B'')/(G1''+G2'') &= \text{GainRBG1G2}' * \{ (R'+B') / \\ &\quad (G1+G2') \} + \text{OffsetRBG1G2}' \end{aligned} \quad \dots (12)$$

Now assuming that  $G1$  and  $G2'$  are fixed values respectively such as  $G1' = G1bD$  and  $G2' = G2bD$ ,  $R''$  and  $B''$  can be calculated from the equations (3) and (6) which calculate  $R''/B''$  and  $(R''+B'')/(G1''+G2'')$  respectively. These  $R''$ ,  $G1''$ ,  $G2''$  and  $B''$  are set as the white sheet data for MWB.

The  $R''$ ,  $G1''$ ,  $G2''$ , and  $B''$  values thus obtained represent values which absorb fluctuations between the image pickup elements in the image pickup apparatuses 1201 and 1202 upon converting the data of the image pickup apparatus 1201 (medium-providing-side image pickup apparatus S) into data of the image pickup apparatus 1202 (medium-use-side image pickup apparatus

D).

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The gain adjustment control value operation unit 411 calculates the ratio of R", G1", G2", and B" from the values obtained by the arithmetic operations (1) and (2) and obtains the MWB and color balance adjustment control values WBR, WBG1, WBG2 and WBB, wherein  $WBR = (G1" + G2") / (2 \times R")$ ,  $WBG1 = (G1" + G2") / (2 \times G1")$ ,  $WBG2 = (G1" + G2") / (2 \times G2")$  and  $WBB = (G1" + G2") / (2 \times B")$ . Then, the gain control value setting unit (setting means) 412 performs settings.

Using the gain adjustment control values thus set, the gain adjustment unit 414 performs MWB or color balance adjustment in the subsequent image pickup. The data are converted into an image file as in the above embodiments. The resultant data is recorded on a recording medium by a medium-recording unit 418.

By the above method, data written in the specific area attached to the image file used for MWB and color balance adjustment is adjusted for fluctuations using the image pickup element fluctuation adjustment operation data of the image pickup apparatus, written in the same specific area. Thus, as long as identical light sources are used, the same R, G, G1, and B values are obtained even when different image pickup apparatus are used. Therefore, data fluctuations between the image pickup apparatuses can be absorbed.

As described above, even if MWB or color balance

control values are obtained using the white sheet data or color balance adjustment data of image files picked up using different image pickup apparatuses, optimal (accurate) MWB or color balance adjustment operation can be done.

According to the fourth embodiment, as described above, white balance adjustment or color balance adjustment using white sheet data can be accurately done in an image pickup apparatus different from that by which the white sheet data are obtained.

In the first to fourth embodiments, the colors of the color filters of the image pickup element are R, G1, G2, and B. However, the present invention is also applicable to complementary color filters of Mg (magenta), Gr (green), Cy (cyan), and Ye (yellow) components, as shown in Fig. 6.

The object of the present invention is realized even by supplying a storage medium storing software program codes for realizing the functions of the above-described embodiments to a system or an apparatus, and causing the computer (or a CPU or an MPU) of the system or the apparatus to read out and execute the program codes stored in the storage medium.

In this case, the program codes read out from the storage medium realize the functions of the above-described embodiments by themselves, and the storage medium storing the program codes therefore